

Geoscientific knowledge and skills in African Geological Surveys

Activity No. 5

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Geohazards mapping and monitoring and Geoheritage in Africa

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EuroGeoSurveys - The Geological Surveys of Europe



OBJECTIVES

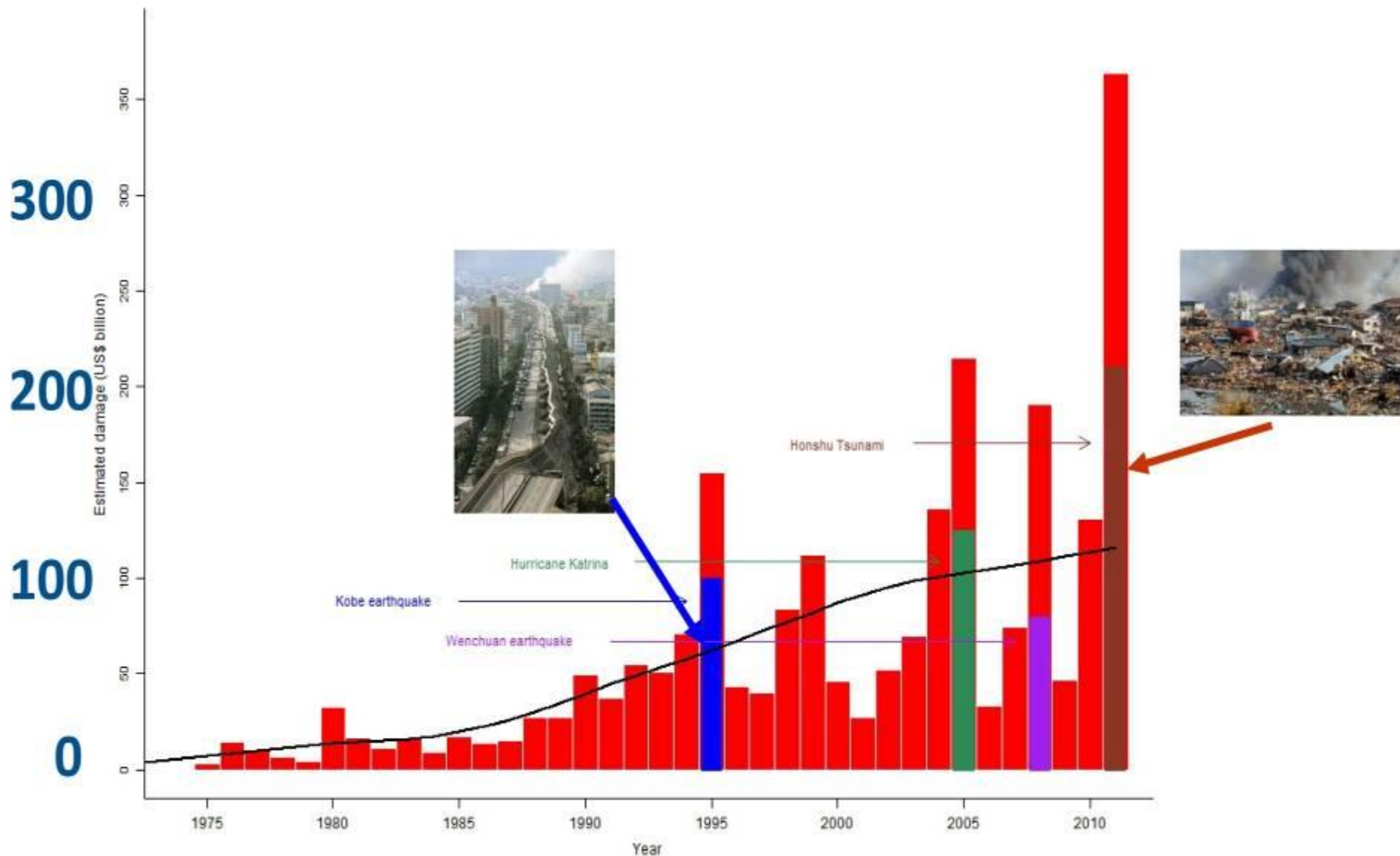
**to strengthen the capability of
OAGS for identification and
management of Geohazards
and Geoheritage**



DESCRIPTION OF WORK

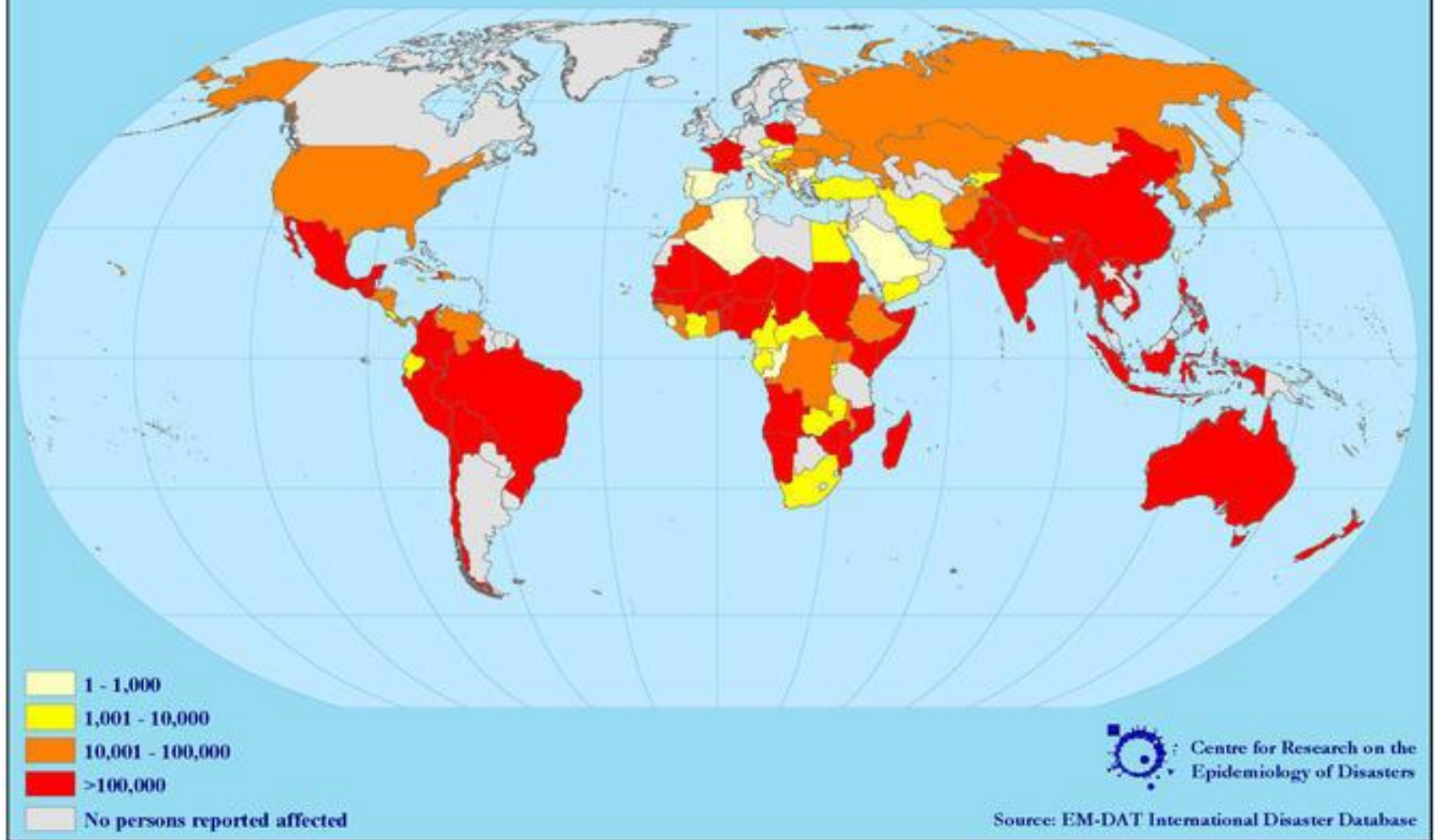
"Geohazards" are events caused by geological features and processes that present severe threats to humans, property and the natural and built environment. Earthquakes, floods, landslides, volcanoes are typical examples of such events. On land and offshore, geological processes, earthquakes and human activities, for instance in connection with mineral exploitation, can cause severe damages.





Estimates damages (US\$ billion) caused by reported natural disasters
1975–2011 (after <http://www.emdat.be>)

Number of persons reported affected by natural disasters in 2010



(from <http://www.emdat.be>)

DESCRIPTION OF WORK

On the basis of review from each country the main geohazards in Africa are as follow:

- Pollution of aquifers and surface environment due to mining activity (gold, hydrocarbons, copper, uranium, coral sands etc.).
- Waste disposal.
- Volcanic activity.
- Earthquakes.
- Landslides.
- Flooding.
- Soil erosion/desertification.

Other

According to our knowledge in 24 African countries (about 43%) geohazards inventory has not yet been made



GEOHAZARDS

Questionnaire

The purpose of this questionnaire is to collect information about state-of-the-art on geohazards analysis:

1. Is your Survey/Government Agency involved or plan to participate in geohazards analysis (i.e. inventories, mapping, monitoring) and risk mitigation strategies (i.e. prevention, awareness, emergency plans)?



What are the most significant geohazards in your country:

- Pollution of aquifers and surface environment due to mining activity (gold, hydrocarbons, copper, uranium, coral sands etc.).
- Waste disposal.
- Volcanic activity.
- Earthquakes.
- Landslides.
- Flooding.
- Soil erosion/desertification.

Other



- **Could you please indicate information sources on geohazards analysis?**
- **Is information/data on geohazards being used for land use/spatial planning?**
- **What are major needs /expectations of your organization in the field of geohazards analysis?**
 - **Proposal of case study subject and location in your country for geohazards analysis**
 - **Other information**



Geoindicators - tools for monitoring of geological change and assessment of the State-of- Environment

Geoindicators are environmental indicators , that deal mainly with natural landscape change. Geoindicators are defined as magnitudes, frequencies, rates or trends of geological processes and phenomena that occur at or near the Earth's surface and that are significant for assessing environmental change

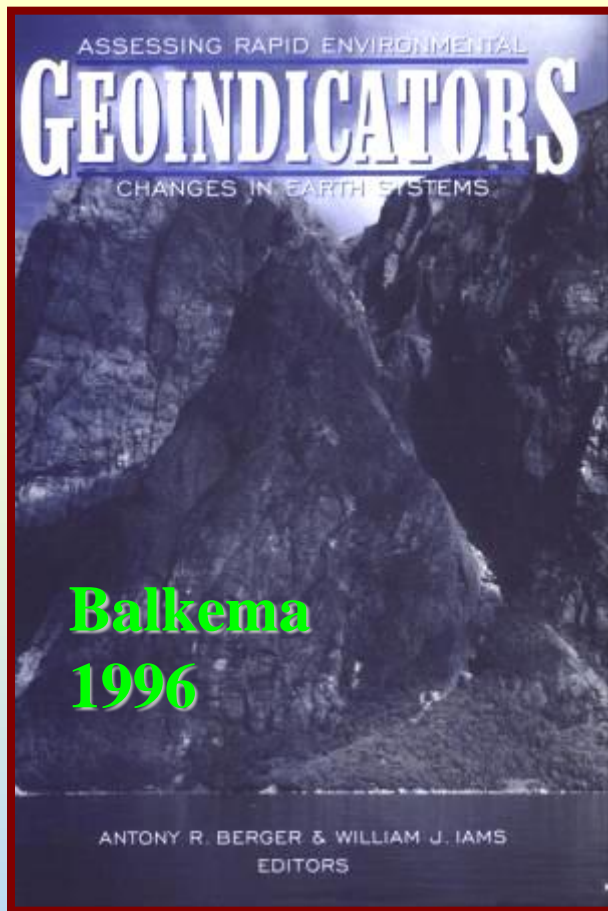


**Geoindicators Initiative (GEOIN) of
the International Union of
Geological Sciences (IUGS) (1992-
2008)**

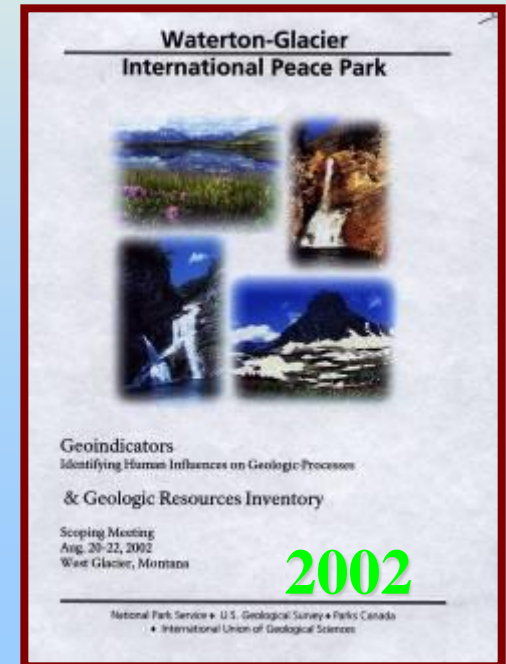
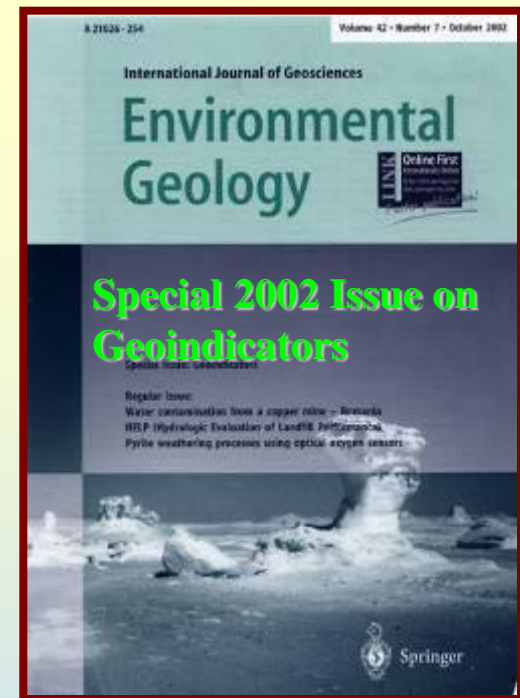
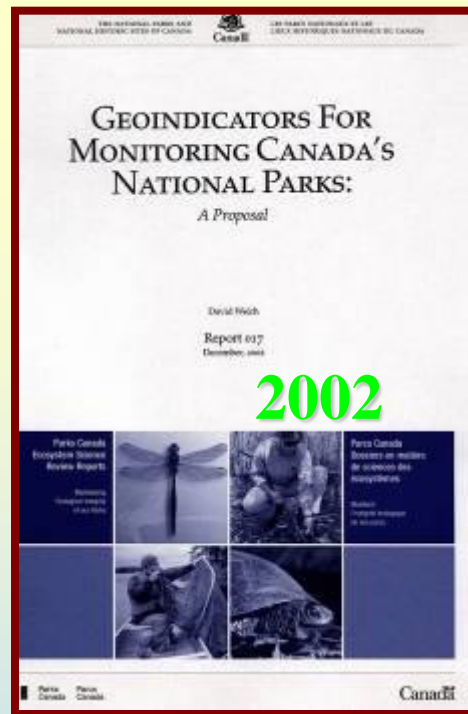
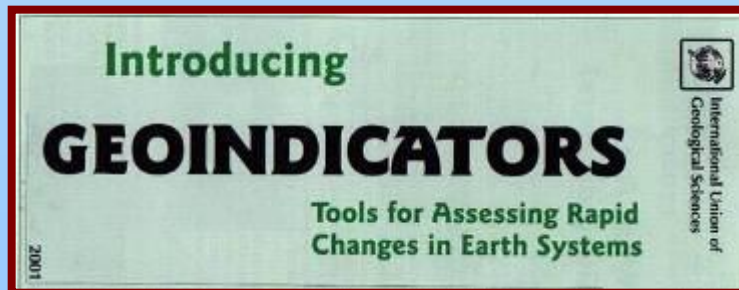
www.geoindicator.org

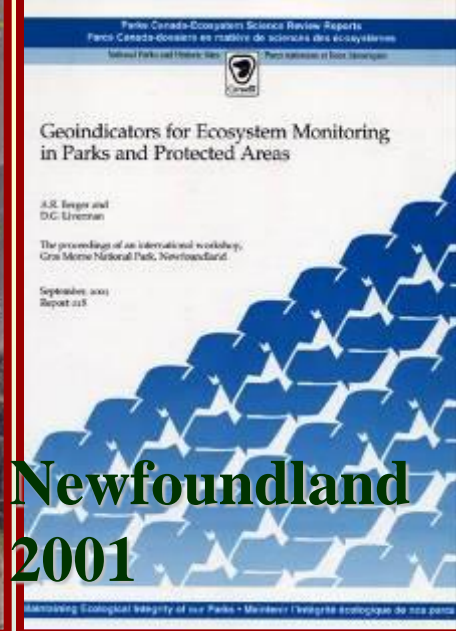
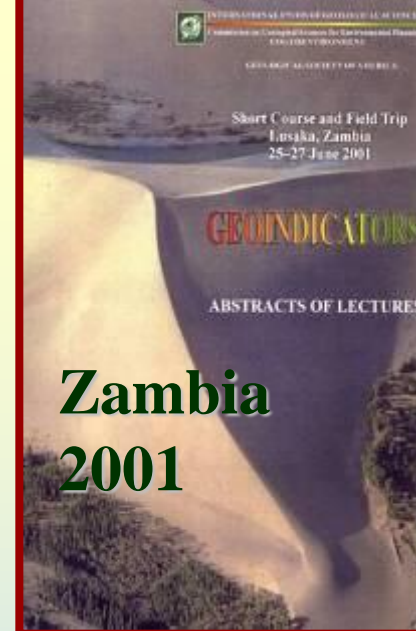
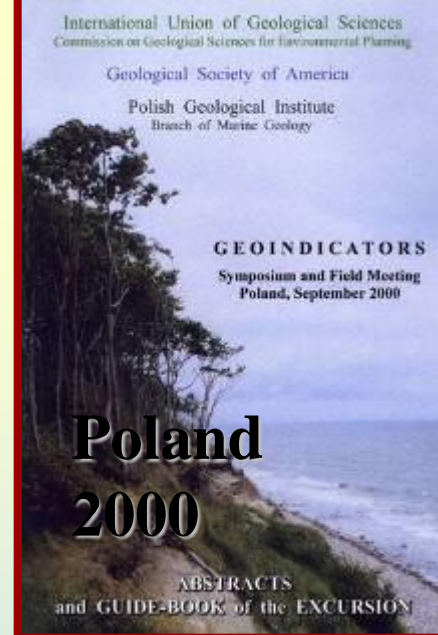
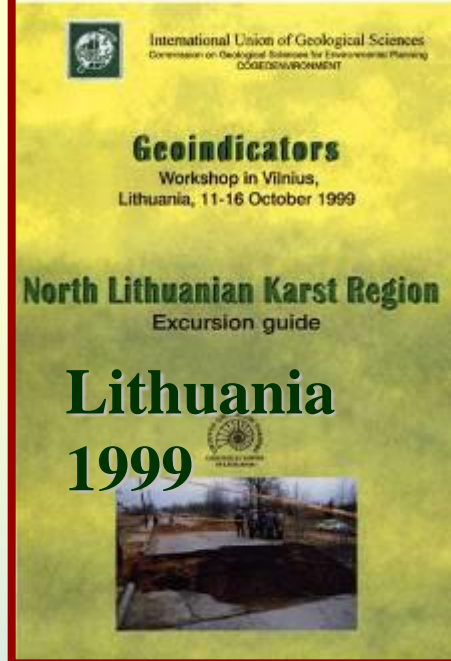
GEOINDICATORS provide a convenient summary of the non-human physical and chemical processes that can change landscapes and ecosystems in less than 100 years.





Some Geoindicator Publications





Australia, 2003, Mauritania, 2004, Italy, 2004

Geoindicator Workshops www.geoindicator.org



The Lusaka (Zambia) vicinities - karstic sinkholes are used for waste disposal

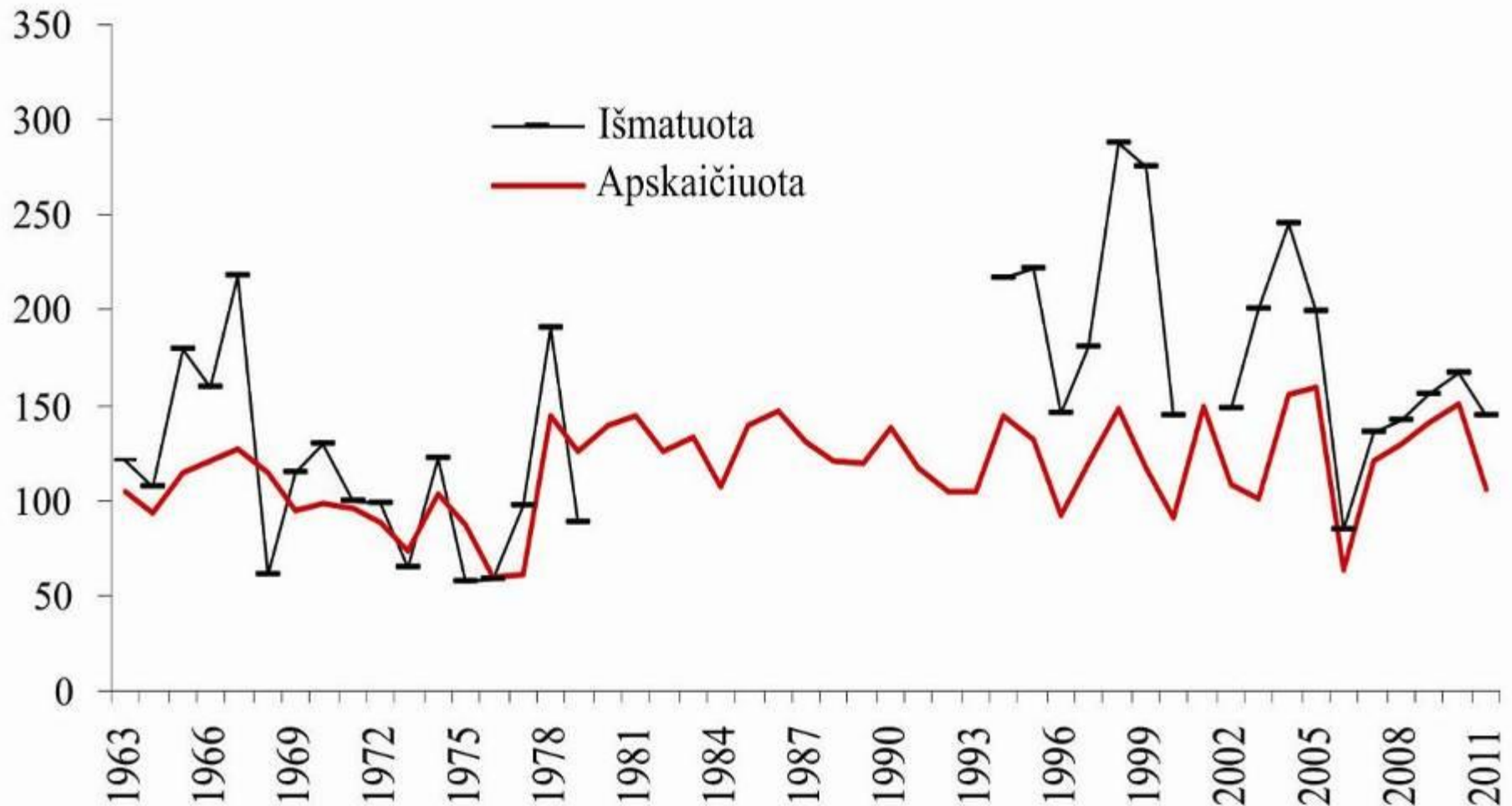
Karst example - Lithuania



Karst example Lithuania



Example: Geoindicator of karst process – karstic denudation. Amount of dissolved gypsum (m^3) from km^2 per annum



Application of **GEOINDICATORS**:

- **Prevention/mitigation of geohazard;**
- **State-of-Environment Reporting;**
- **Spatial planning;**
- **Environmental Impact Assessment**

GEOHAZARDS:

**Aim -prevention/mitigation of
geohazard;**

How?

Understanding, mapping, monitoring.

**Applying modern techniques
(interferometry, etc.)**

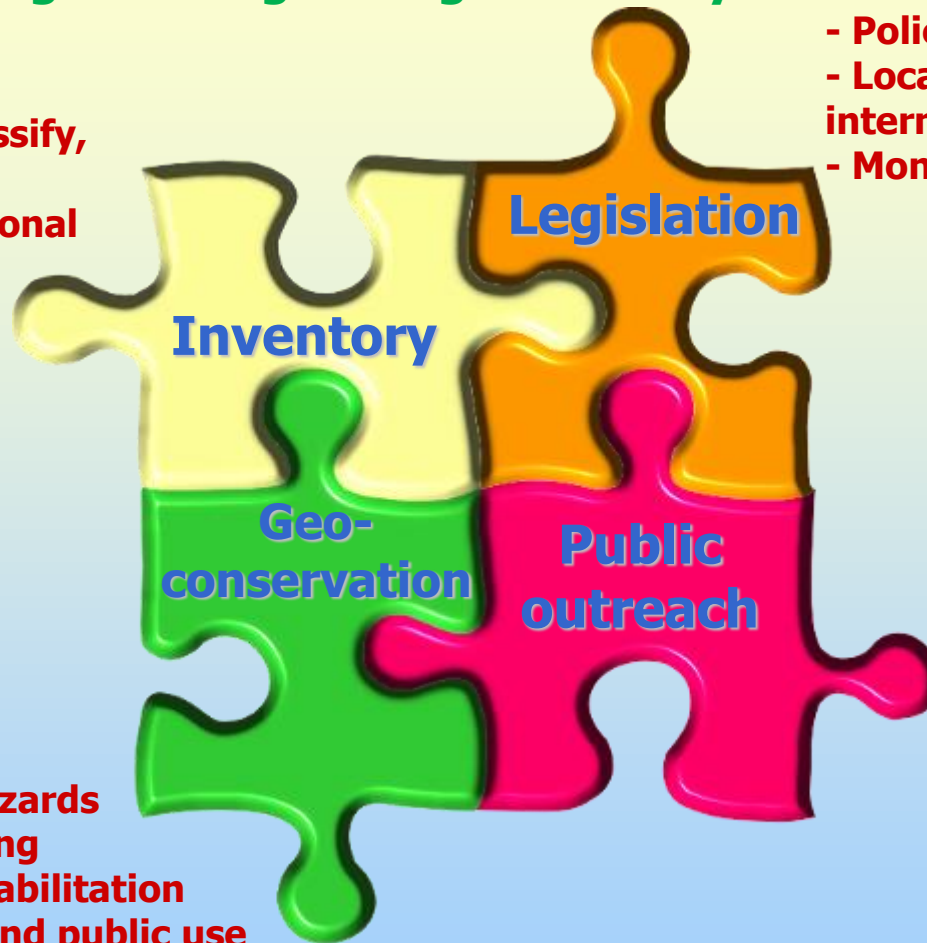


**Azure Window,
Gozo Island,
Malta**

Geoheritage constitutes a natural heritage of scientific, cultural, aesthetic, landscape, economic and intrinsic values, which needs to be preserved and handed down to future generations

The conservation of geoheritage and geodiversity

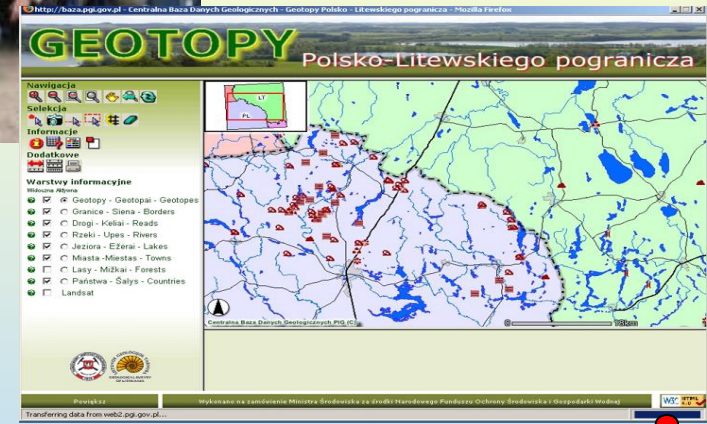
- Identify, locate, classify, map and assess
- Local, regional, national and international
- Databases
- Revise periodically



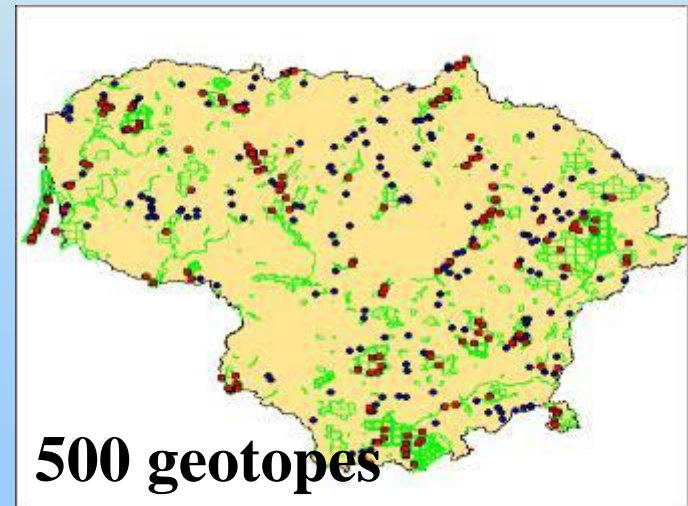
- Strategic planning
- Policies
- Local, regional, national and international
- Monitoring and enforcement

- Vulnerability and hazards
- Management planning
- Restoration and rehabilitation
- Zoning, protection and public use
- Impact prevention and minimization
- Preservation of values and services

- Itineraries
- Guided tours
- Workshops
- Publications
- ICTs
- Education



- Annual Meetings, conferences and field symposia
- List of most representative geosites of region
- Global Geosites Project (IUGS) and EU projects
- National geotope databases



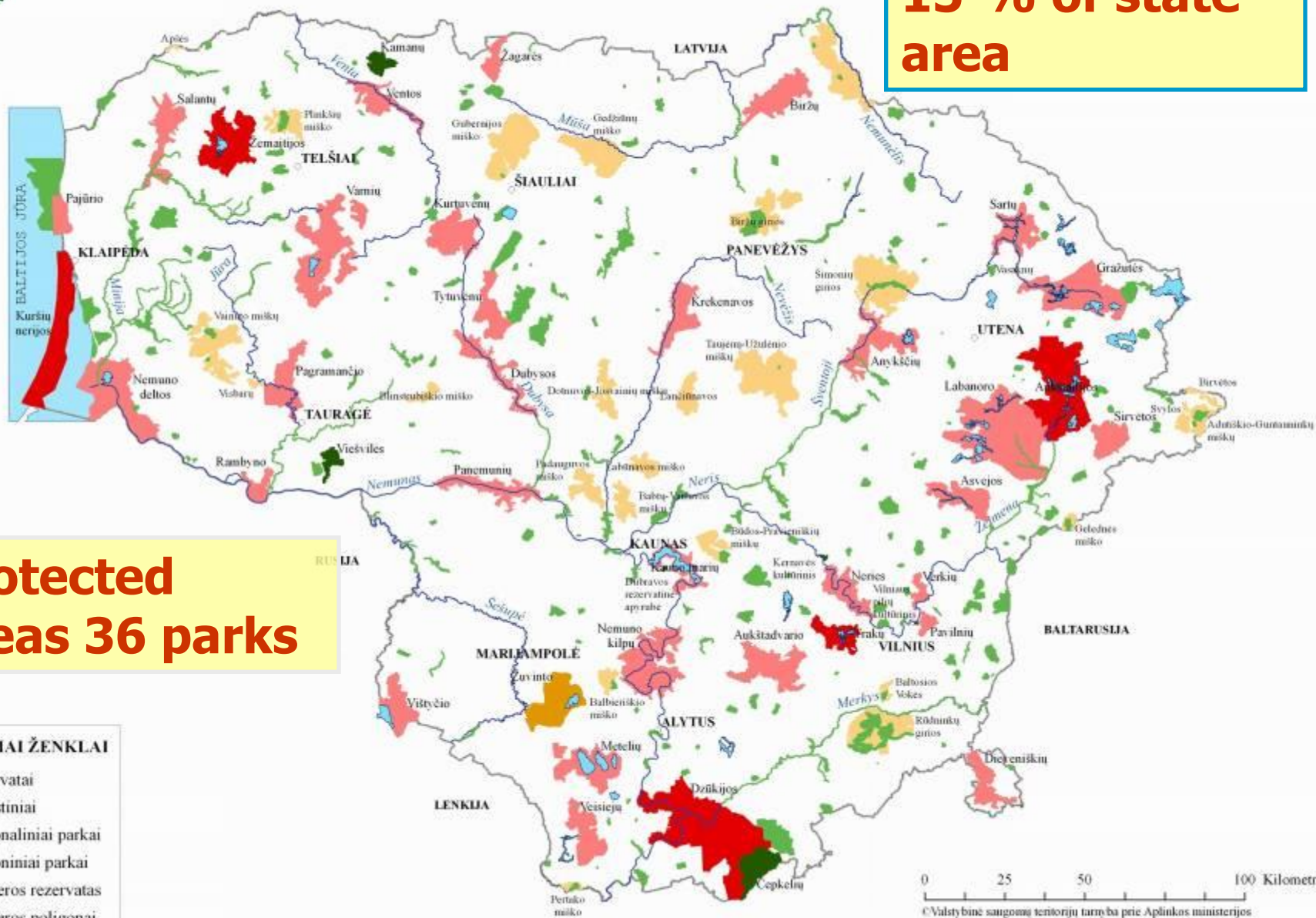
SAUGOMOS TERITORIJOS

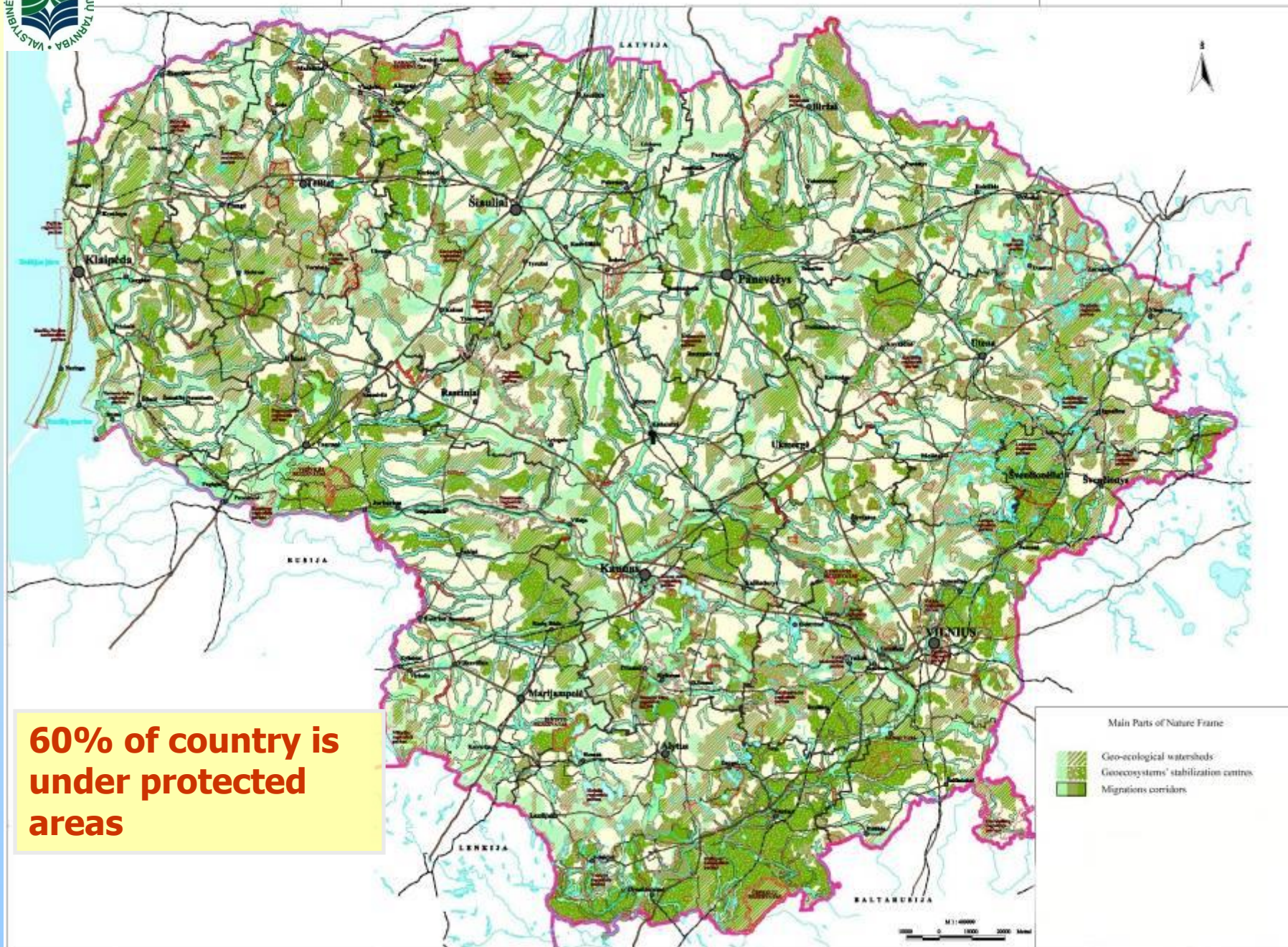
**15 % of state
area**

**Protected
areas 36 parks**

SUTARTINIAI ŽENKLAI

- Rezervatai
- Draustiniai
- Nacionaliniai parkai
- Regioniniai parkai
- Biosferos rezervatas
- Biosferos poligonai





60% of country is under protected areas

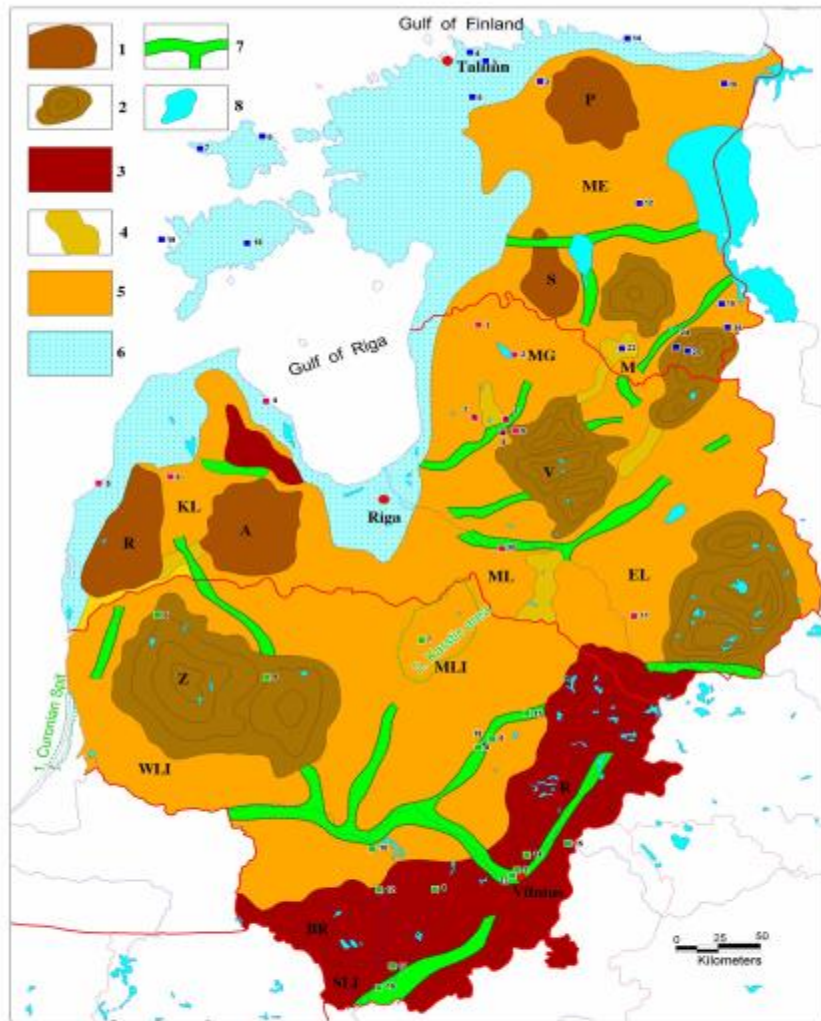


Akmene stone, Tytuvėnai
Regional Park

Framework of Geodiversity of the Region

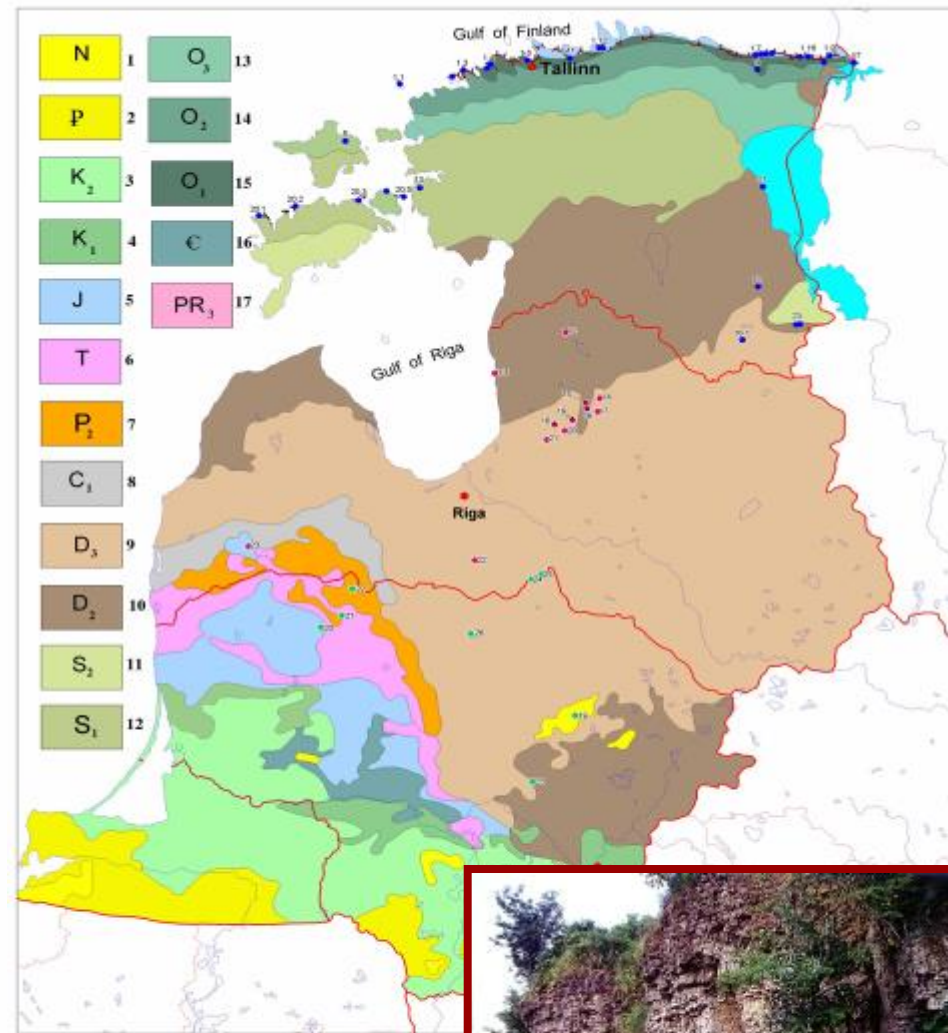
Schematic geomorphologic map of the Baltic Region

(modified after A. Gaigalas et al., 1984)



Sketch of the bedrock geology of the Baltic Region

(modified after A. Gaigalas et al., 1984)



1 - Neogene; 2 - Paleogene; 3 - Upper Permian; 6 - Triassic; 7 - Permian; 8 - Carboniferous

11 - Upper Silurian; 12 - Lower Silurian; 15 - Lower Ordovician; 16 - Lower Cambrian

Location of geosites (according to national lists)

HIGHLANDS: 1 - insular exaration - accumulative (plinth type heights); 2 - insular glaciostructural-accumulative; 3 - ice marginal glaciostructural - accumulative; 4 - interlobate high. **LOWLANDS:** 5 - glaciodepressional lowlands (till plains, drumlin fields, ribbed moraines, uval moraines, flutings, eskers and local ice-dammed lake plains); 6 - abrasion-accumulation plains of the Baltic Ice Lake and younger stages of the Baltic Sea; 7 - the largest spillway valleys; 8 - the largest lakes. **MAJOR LOWLANDS:** ME - Middle - Estonian Lowland; MG - Middle-Gauja Lowland; ML - Middle - Latvian Lowland; EL - East Latvian Lowland; MLI - Middle - Lithuanian Lowland; WLI - West - Lithuanian Lowland; SLL - South Lithuanian Lowland, KL - Kursas (Venta) Lowland. **MAJOR HIGHLANDS:** R - Rietumkursas; A - Aukštaitija; S - Sakala; P - Pajūris; O - Opatovė; H - Hailu (together with the Aluksne Highland); V - Vidzeme; Z - Zemaitija; BR - Baltic Ridge (together with the Augšzeme Highland); ZK - Ziemeļkurzeme.

Location of geosites (according to national lists)

GEOHERITAGE

Questionnaire

The purpose of this questionnaire is to collect information about the current situation on **geoheritage inventories, protection, promotion and use.**

- **Is Survey/Government Agency involved or plan to participate in geoheritage analysis (i.e. inventories, mapping, assessment, promotion)?**
- **Is there a geoheritage inventory? Has it identified the most significant (nationally and internationally) geosites in your country? Did it follow the methodology for geosite identification? (Global Geosites Project)**
- **Are there other information sources on geoheritage? (universities, research centres, local stake-holders)**
- **Is mining heritage related to geoheritage (examples, cases)?**

- **Is information/data on geoheritage being used for land use/spatial planning?**
- **Is geoheritage already important from an economic point of view (e.g. tourism development)? Geopark initiatives? Interpretive centers? Geological itineraries?**
- **What are the major needs /expectations of your organization in the field of geoheritage analysis? (concepts, methodology...)**
- **Proposal of case study subject and location in your country for geoheritage analysis**
- **Other information**

GEOHERITAGE:

- Is a valuable geological resource;**
- A holistic approach is essential;**
- Inventory of geoheritage is duty of geoscientists**

DELIVERABLES

- Update of Geohazards and Geoheritage inventories by distribution of the Questionnaire and collecting information at the 2014 workshop**
- ToR for Geohazards and Geoheritage inventories, training and education in OAGS countries in scope of the future Pan-Africa programme**

**THANK YOU FOR YOUR
ATTENTION!**

